IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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TITLE: A SOLUTION OF METAL-POLYMER CHELATE(S) AND APPLICATIONS THEREOF

Amendment D: REMARKS

Upon entry of the present amendments, previous Claims 42 - 72 have been presented herein. Claims 42 and 51 have been amended herein. Reconsideration of the rejections, in light of the foregoing amendments and present remarks, is respectfully requested. The present amendments have been entered for the purpose of clarifying the nature of the claim language and for conforming to the requirements of the Examiner.

In the Office Action, Claims 42 - 72 were rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement. Claims 42 - 72 were also rejected under 35 U.S.C. §112, second paragraph, as being indefinite.

As an overview to the present reply, Applicant has submitted the Examiner's comments to the inventor. The inventor has provided an extensive reply herein with respect to these comments. In particular, it is now suggested, by the inventor, that independent Claim 42 be amended so as to replace the term "skeleton" with the term "structure". Additionally, there reference to "0.0001" with respect to the "amino group" has been replaced with "0.01". Additionally, the language in dependent Claim 51 has been amended so as to indicate that the monosaccharide has the "linear polymers".

With respect to the formality objections as to the present claims, the inventor has indicated to the undersigned attorney that the disclosure has been fully made in the specification. With respect

to the lack of disclosure and description of the "immobilization of a bio-carrier", page 2 of the original specification states:

> A : for immobilization of a bio-carrier→If the paper→In early days, there were <u>carriers</u> for absorbing and neutralizing gases, but there was no carrier to deal with a solvent gas directly, and the reacting <u>carriers</u> at early days came with a very short life. However, the physiologically active life of the present hydroxypropylmethyl celluloses (HPMC) and other matters with special functional groups can be extended unlimitedly and developed to be an artificial imitated chitosan solution containing metal ions, so as to provide high-efficiency, high-density, high-activation and long-life <u>biological carriers</u>. The metal hybrid polymer solution is used for gas detections and the solution also becomes a metal enzyme biocatalyst.

Further, page 2 of the original specification recites that "the metal hybrid polymer solution can be developed further to provide novel biochemical enzyme systems and <u>enzyme immobilization systems</u>.

Page 23 of the original specification recites as follows:

> Now, the chemical solution and chemical state and chemical molecular structure are the same as those of chitosan which is a polymer hybrid and will become an artificial imitated chitosan solution containing metal ions and then bacteria or enzyme or smaller nucleic acid or partial cell body is added. It is not necessary to consider its nitration sources and metabolism issues After being blended and shaken for a period of time (which is determined by the size of the reaction tank, and generally equal to two weeks), the metal ions excite the activity of the enzyme, and a rear end of theNH2 group is connected to a protein enzyme, and an amino polysaccharide such as molassesm with a quick fermentation growth life, a super high concentration, a highly active cell body or bacteria or enzyme or nucleic acid <u>solidifies a carrier</u> to produce a biochemical solution having cell body or bacteria or enzyme or nucleic acid. If the solution of artificial imitated chitosan has a hydroxypropylmethyl cellulose (HPMC) with a higher molecular weight, the stability of bacteria or enzyme stability will be high, and the life expectancy will be long, and it will not be saccharified easily. If the molecular weight is low, then the CPS400 will be as follow:

Further, on page 23, it is stated that:

> Just like a common chitosan, it will be saccharified easily to turn into glycan, bacteria or enzyme, and the preservation cannot last too long, and its life expectancy is about one year. In general, the life expectancy of a normal pure chitosan solidified enzyme is very short, but the life expectancy will become one year if the metal ions are added,--- .(page17,18)

Additionally, and furthermore, on page 30 of the original specification the immobilization is further recited as follows:

> Carbohydrates such as monosaccharide are added and mixed evenly, and then the growth of bacteria or enzyme or tiny nucleic acid or partial cell body can be maintained, and its solidified structure includes: PVA-metal M-NH2-protein enzyme-sugar, which is R-M-NH2-protein enzyme-sugar, and such structure can preserve the bacteria with a long life. Since the PVA does not have asymmetric carbons, it only can maintain the life of bacteria without a good duplicating capability. If there are asymmetric carbons in the aforementioned situation, the life of bacteria can be maintained and a good duplicating capability is provided as well. Further, a polymer unit that is not saturated with fatty acid is taken for example, and an oil is added into the acetic acid, pure water, metal salts, ammonia water, monosaccharide and mixed evenly, and then bacteria or enzyme or smaller nucleic acid or partial cell body are added for the growth of fermentation, and its solidified structure includes: fatty acid-M-NH2-protein enzyme-sugar, and such structure can maintain a long life for the bacteria. In fact, the hybrid of carboxyl and metal ions of the fatty acid and the hybrid structure produced by the allocated amino groups can solidify and fix the enzyme protein, since this inorganic and organic applications. The PVA is added with silicic acid, and the -OH groups of the two are dehydrated to form a PVA-SI-M-NH2-protein enzyme-sugar connecting structure. If the protein enzyme uses a protein enzyme for decomposing sugar and the alcohol to kill bacteria, a volatile solution is formed or heated, dried and disinfected to form a nano inorganic polymer film showing a PVA-SI-M, wherein silicon will not be precipitated from the reaction, and IS and M are both in a nano scale, and the PVA can use other R (polymer) including -OH coating layer and show a hybrid porous structure that has good adsorptability and it is a very good nano inorganic carrier and can be used as nano paint, nano particles

entering this carrier or paint, and it is also a very good reacting structure. Through the metal hybrid, the fermented silicic acid becomes a very good inorganic medium. The nano inorganic polymer film, hole carrier, and sphere developed by the nano metal hybrid polymer solution (fermented) is more functional than those not in a nano scale. In general, PVA-SI-Ca is used to obtain a good stability and functionally a PVA-SI-other metal is preferred and used. This is one of the applications of the metal hybrid polymer solution used for nano inorganic matters. (page40)

Finally, example 13 of the original specification on page 58 supports the "immobilization of a bio-carrier" as follows:

Embodiment 13
In the application of producing chemical substances in a plant (used for fermentations and nano applications), the composition in the percentage by mass is given as follows:

Bacteria-free water	90%
Vinegar or carboxyl acid	2%
Cytokinin-O-glucosides	2%
Calcium sulfate and various inorganic salts (added separately)	2%
Ammonia water	2%
Special DNA, RNA and/or enzyme of a plant	Trace

A carrier similar to partial cell tissue of a plant or a fatty acid-M-NH2-protein enzyme-sugar carrier together with a solidification carrier (such as R-unhusked rice-NH2-protein enzyme system) is cultivated. (page51)

As such, Applicant respectfully contends that there is proper support in the specification for such limitations.

The inventor respectfully disagrees with the Examiner's analysis that the term "bio-carrier skeleton" was not disclosed in the original specification. So as to clarify the matter, the inventor has provided us with information in this regard. In particular:

A chemical compound having the same chemical conditions and functions as the chitosan includes a hydroxypropylmethyl

cellulose (HPMC) and an amino group, and the metal ion acts as a medium for being a catalyst for the metal ions, such that the hydroxypropylmethyl cellulose (HPMC) can be mixed with NH3. If the hydrogen of a R-OH functional group of the hydroxypropylmethyl cellulose (HPMC) is dehydrogenated and dehydrated by the metal such that NH2 can be halfly bridged and combines with the hydroxypropylmethyl cellulose (HPMC) to produce R-NH2. By then, this solution is a polymer hybrid having the same chemical solution, chemical state and chemical molecular structure as those of chitosan, and becomes an artificial imitated chitosan solution containing metal ions. The bacteria or enzyme or nucleic acid or partial cell body is developed to a long-life, high-concentration bacteria or enzyme or nucleic acid or cell body carrier. The imitated chitosan of the artificial imitated chitosan solution can be used in any area that the chitosan is used. The solution is fermented to produce a metal to a nano scale, and nano metal particles or nano metal oxides or nano complex metal oxides can be obtained by gas phase or liquid phase or combustion or carbonization methods. The imitated chitosan is developed into liquid crystal solution and other aspects for the applications in eight major enzyme systems. The principle for these eight major enzyme systems is similar to the principle described above. Regardless of having hydroxyl or hydroxyl and amino and/or carboxyl and/or carbohydrate polymer or disaccharide or monosaccharide or monosaccharide bimolecule, the imitated chitosan can be combined with the metal salts and then combined with carboxyl and amino groups to produce low to mid polymer metal-polymer cholates. Some enzyme systems use inorganic polymer carrier and/or plant fiber and/or carboxyl resin and amino resin or inorganic matter and/or enzyme system and the principle for the application in biochemical and nano areas. A chemical compound having the same chemical conditions and functions as the chitosan includes a hydroxypropylmethyl cellulose (HPMC) and an amino group, and the metal ion acts as a medium for being a catalyst for the metal ions, such that the hydroxypropylmethyl cellulose (HPMC) can be mixed with NH3. If the hydrogen of a R-OH functional group of the hydroxypropylmethyl cellulose (HPMC) is dehydrogenated and dehydrated by the metal such that NH2 can be halfly bridged and combines with the hydroxypropylmethyl cellulose (HPMC) to produce R-NH2. By then, this solution is a polymer hybrid having the same chemical solution, chemical state and chemical molecular structure as those of chitosan, and becomes an artificial imitated chitosan solution containing metal ions. The bacteria or enzyme or nucleic acid or partial cell body is developed to a long-life, high-concentration bacteria or enzyme or

> nucleic acid or cell body carrier. The imitated chitosan of the artificial imitated chitosan solution can be used in any area that the chitosan is used. The solution is fermented to produce a metal to a nano scale, and nano metal particles or nano metal oxides or nano complex metal oxides can be obtained by gas phase or liquid phase or combustion or carbonization methods. The imitated chitosan is developed into liquid crystal solution and other aspects for the applications in eight major enzyme systems. The principle for these eight major enzyme systems is similar to the principle described above. Regardless of having hydroxyl or hydroxyl and amino and/or carboxyl and/or carbohydrate polymer or disaccharide or monosaccharide or monosaccharide bimolecule, the imitated chitosan can be combined with the metal salts and then combined with carboxyl and amino groups to produce low to mid polymer metal-polymer cholates. Some enzyme systems use inorganic polymer carrier and/or plant fiber and/or carboxyl resin and amino resin or inorganic matter and/or enzyme system and the principle for the application in biochemical and nano areas.

It can be seen that the "bio-carrier structure" was described on page 10 regarding the "or other polymer (chemical substance-OH)$_n$ functional group solutions together with ammonia (or amines)". Additionally, support for this "structure" is found on pages 32 and 33 of the original specification as follows:

> For example, a disaccharide such as sucrose having a low molecular weight is added with acetic acid, pure water, metal salts, ammonia water and mixed evenly, and then bacteria or enzyme or smaller nucleic acid or partial cell body is added for the fermentation and growth, and the <u>solidified</u> structure includes: sucrose-M-NH2-protein enzyme, and this kind of structure does not need the assistance of carbohydrates, because it already has sucrose, and thus the life of bacteria can be maintained very long. Another protection of the sucrose resides on that the whole dry sugar cane can be cut into small pieces so that they cannot be separated from the bagasse, and the juice of sugar can will not turn rotten because of the protection provided by such dry sugar cane fiber, and then acetic acid, pure water, metal salts, ammonia water are applied and mixed evenly, and the bacteria or enzyme or smaller nucleic acid or partial cell body can be fermented and grown, and its <u>solidified</u> structure includes:R-sucrose-M-NH2-protein enzyme, wherein R refers to a dry sugar cane fiber (plant fiber). Assumed that monosaccharide, acetic

acid, pure water, metal salt, ammonia water are mixed evenly, a polymer hybrid will not show, but only a single scattered micromolecular hybrid shows, and they cannot be connected into a whole piece, so that the stability and constancy of fermentation is very limited. The fermentation used to achieve the metal in a nano scale is not very effective, since the overall current is not driven. If polymer bridging agent or plant fiber or inorganic polymer carrier (including inorganic and organic bridge inorganic polymer or nano inorganic polymer) imitates the theory of a dry sugar cane fiber, the fermentation and metal nano condition of a small hybrid molecule at the connecting portion can be improved. Therefore, the formula also can be applied to the arrangement of mixing monosaccharide, acetic acid, pure water, metal salts, ammonia water evenly and adding polymer bridging agent or plant fiber or inorganic polymer carrier,----- (page25)

Additionally, and furthermore, the specification further provides support on page 35 as follows:

DNA and RNA that uses the following cultivation and purification of the biological protein enzyme as a carrier (such as the R-unhusked rice-NH2-protein enzyme system) to combine and include the monosaccharide bimolecule-M-NH2-protein enzyme system, and it also can cultivate the chemical substances required in a plant. (page26)

As such, such the inventor respectfully contends that the "bio-carrier structure" is properly described in the original specification and how the hydroxyl group containing polymer and methal salt reacts together to form such a structure.

Applicant has revised the claims so as to indicated that the decimal range has been revised as 0.01 - 20% of an amino group. There is support for the .0001 of the metal salt having at least one metal ion.

Relative to the lack of support for the "mixture of chelates forming a chain", found on page 13 and 14 of the original specification as follows:

A:" a mixture of the chelates forming a chain which contains positive and negative polar functional groups:" →If the paper →The principle for these eight major enzyme systems is similar to the principle described above. Regardless of having hydroxyl or hydroxyl and amino and/or carboxyl and/or carbohydrate polymer or

> disaccharide or monosaccharide or monosaccharide bimolecule, the imitated chitosan can be combined with the metal salts and <u>then combined with carboxyl and amino groups</u> to produce low to mid polymer metal-polymer cholates. Some enzyme systems use inorganic polymer carrier and/or plant fiber and/or carboxyl resin and amino resin or inorganic matter and/or enzyme system and the principle for the application in biochemical and nano areas. (page10)

Additionally, Figure 3 supports this limitation. Additionally, on page 28 of the original specification it was recited as follows:

> A: →If the paper → From the description above, a carboxylic acid including a -COOH group dissolves chitosan or hydroxypropylmethyl cellulose (HPMC) or the R-NH2 includes an amino group just like the humic acid already having a carboxyl group, so that the whole solution has the amino (alkaline) group as well as the carboxyl (acidic) group, and the <u>so-called positive and negative molecules</u> for driving the catalysis of the whole solution. In the formation of hybrids, the <u>negative molecule and positive molecule</u> are adjacent to each other and gradually developed to tens or hundreds of hybrid tissues, just like the form of protein tissues. The amino acid also has an amino (alkaline) group and a carboxyl (acidic) group, and they are connected <u>linearly</u> to form <u>circular bond</u> to provide a unique configuration for each <u>protein</u>. Since the hybrid solution and protein tissue provide a very good compatibility for the <u>positive and negative</u> charges and are developed to carries of the protein substances such as cell, bacteria, enzyme, nucleic acid, DNA and RNA---- (page21)

Figure 3 is a schematic view of the process producing an amino polymer metal enzyme hybrid of the present invention by reacting the carbohydrate molecule and/or hydroxyl or hydroxyl amino and/or carboxyl and/or carbohydrate polymers with the metal ions to obtain the polymer metal hybrid, and the polymer metal hybrid further includes an amino group or an amino polymer metal hybrid obtained from the reaction to combine with an amino polymer metal hybrid containing -COOH carboxyl group for the fermentation of protein enzymes to obtain the amino polymer metal enzyme hybrid.

Applicant has revised Claim 51 so as to indicate that the monosaccharide has "linear polymers" and that the polyvinylpyrrolidone does not have the "linear polymers". This should overcome the objection.

Applicant respectfully contends that the claims are in a proper form. The inventor has suggested this language and is quite confident that this language conforms with U.S. requirements.

Based upon the foregoing analysis, Applicant contends that independent Claim 42 is in a proper condition for allowance. Additionally, those claims which are dependent upon Claim 42 should also be in a proper condition for allowance. Reconsideration of the rejections and allowance of the present claims at an early date is earnestly solicited. Since no new claims have been added above those originally paid for, no additional fee is required.

Respectfully submitted,

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